



*Better Buildings Residential Network
Peer Exchange Call Series*

*Electric Vehicles and Residential Energy Efficiency:
Preparing for the Historical Increase*

November 10, 2022

Agenda and Ground Rules

- Agenda Review and Ground Rules
- Residential Network Overview and Upcoming Call Schedule
- Opening Poll
- Featured Speakers
 - **Scott Sklar**, The Stella Group
 - **Phillip Kobernick**, Peninsula Clean Energy
- Open Discussion
- Closing Poll and Announcements

Ground Rules:

1. **Sales of services and commercial messages are not appropriate** during Peer Exchange Calls.
2. Calls are a safe place for discussion; **please do not attribute information to individuals** on the call.

The views expressed by speakers are their own, and do not reflect those of the Dept. of Energy.

Better Buildings Residential Network

Join the Network

Member Benefits:

- Recognition in media, social media and publications
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- One-on-One brainstorming conversations

Commitment:

- Members only need to provide *one number*: their organization's number of residential energy upgrades per year, or equivalent.

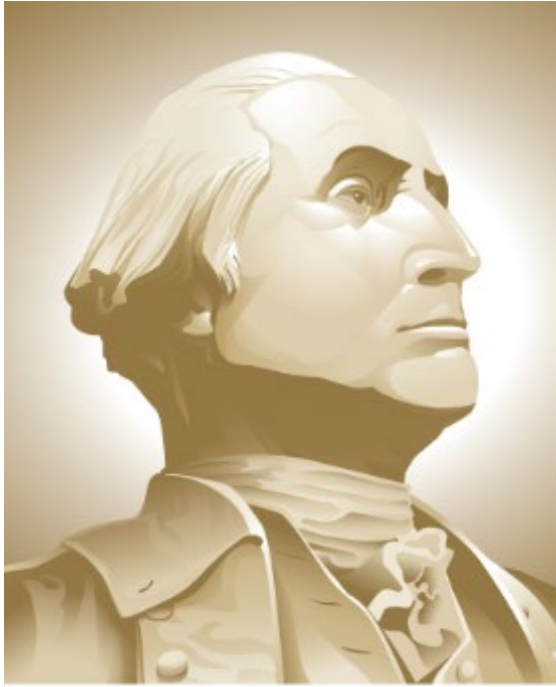
Upcoming Calls (2nd & 4th Thursdays):

- *12/08: The Big Heat Pump Push – How are Programs, Contractors, and the Grid Responding?*

Peer Exchange Call summaries are posted on the Better Buildings [website](#) a few weeks after the call



Scott Sklar
The Stella Group



THE GEORGE WASHINGTON UNIVERSITY

WASHINGTON, DC

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The Stella Group, Ltd.

The Stella Group, Ltd.. is a strategic technology optimization and policy owner's rep firm for clean distributed energy users and companies which include advanced batteries and controls, energy efficiency, fuel cells, geoexchange, heat engines, microhydropower (including tidal and wave), modular biomass, photovoltaics, small wind, and solar thermal (including CSP, daylighting, water heating, industrial preheat, building air-conditioning, and electric power generation). Scott Sklar serves on the national Boards of Directors of the non-profit Business Council for Sustainable Energy and S3dif. He teaches three unique interdisciplinary sustainable energy courses at The George Washington University (GWU) and serves as Sustainable Energy Director of GWU's Environment & Energy Study Institute (EEMI). Scott Sklar was awarded the prestigious The Charles Greely Abbot Award by the American Solar Energy Society (ASES) and on April 26, 2014 was awarded the Green Patriot Award by George Mason University in Virginia.

The Stella Group, Ltd. 703-522-1195 www.TheStellaGroupLtd.com solarsklar@aol.com

706 North Ivy Street Arlington, Va 22201

US DOE WEBINAR – EV CHARGING

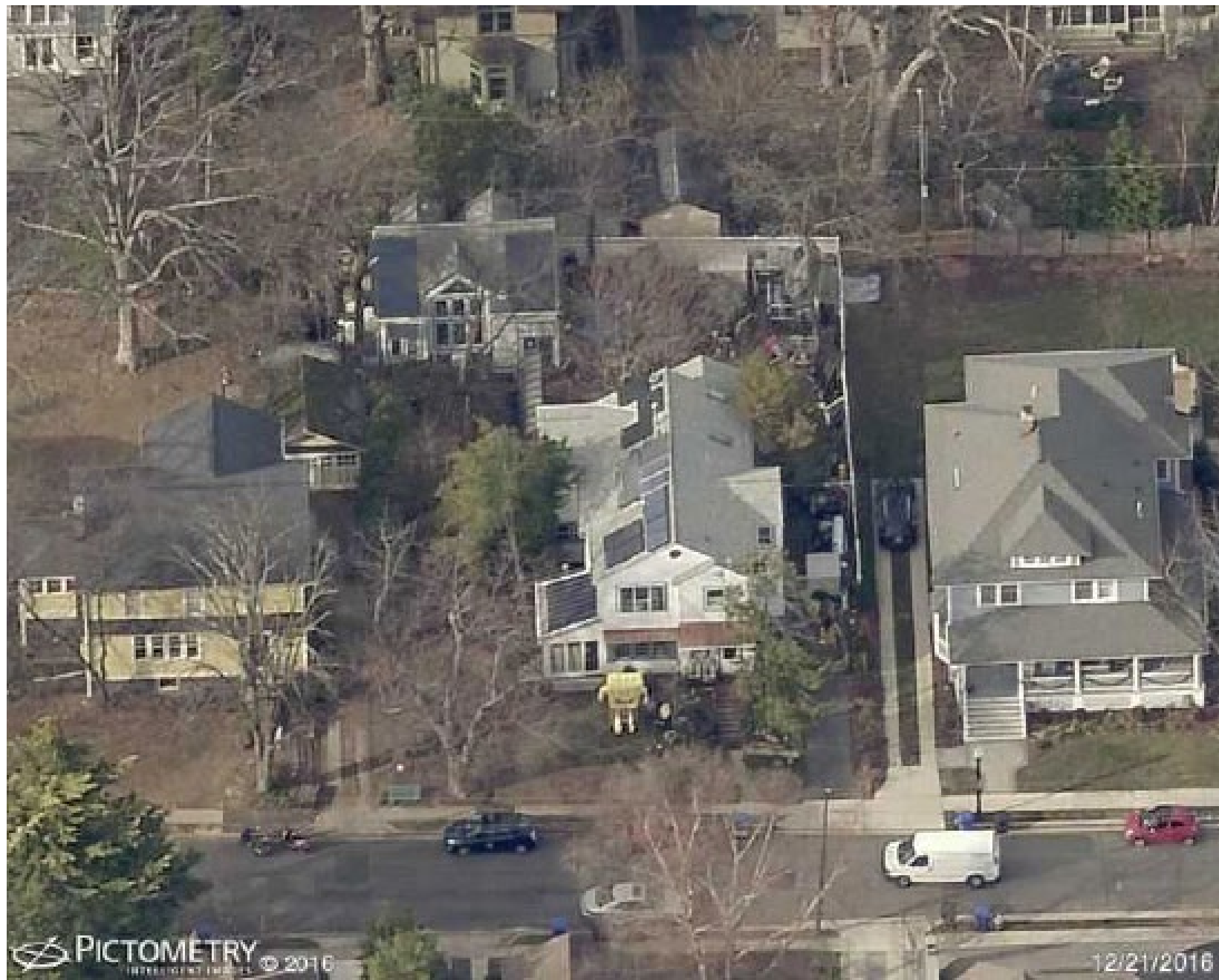
Thursday, November 10, 2022

Panel from 1:00 p.m. to 2:30 p.m. ET

SKLAR HOME – SKLAR EV & EV CHARGING

THE STELLA GROUP, LTD OFFICE BUILDING

ARLINGTON, VA



EAST SIDE – House (mid-front), office building (mid-rear)

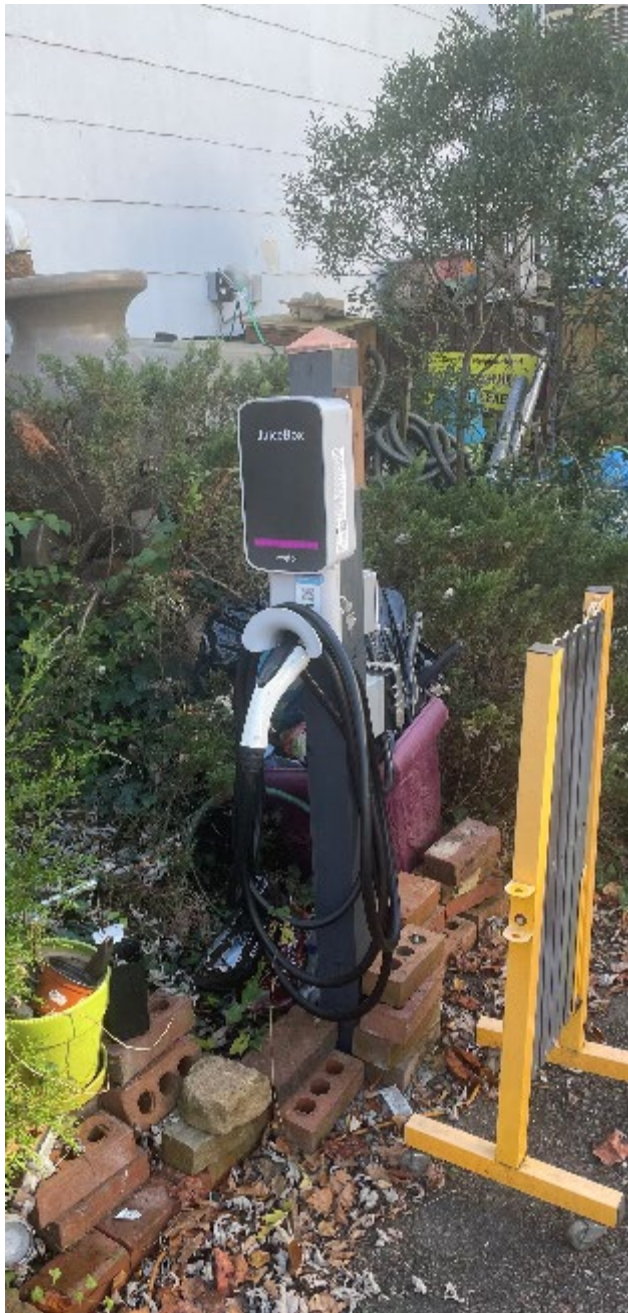


New Sunpower PV modules (8/30/2022) replacing Solarex PV panels installed in 1985 so as to have more output to charge new 2022 EV Nissan Leaf SL.



16 Concorde (CA) Absorbed Glass Matrix (AGM) Battery Bank (Sklar Home)
Model: PVX-2580L Deep Cycle AGM Battery 12 volt, 258 AH 159 lbs

100% charge -94 degrees F at 50% charge – 13 degrees F Max 125 degrees F



2022 Nissan Leaf SL – charging in November 2022

Juice Box charger 40 amp circuit from PV – battery system

MARKET & POLICY TRENDS 2022

Electric Vehicle Infrastructure Enters Catch-Up Mode

MOBILITY. by [Martin Armstrong](#), September 20, 2022

With bans on the production of petrol- and diesel-powered cars on the horizon in a number of key markets, the [pace of EV penetration is really picking up](#). When it comes to public infrastructure to match this growing demand though, a lot of countries are still [a long way behind](#).

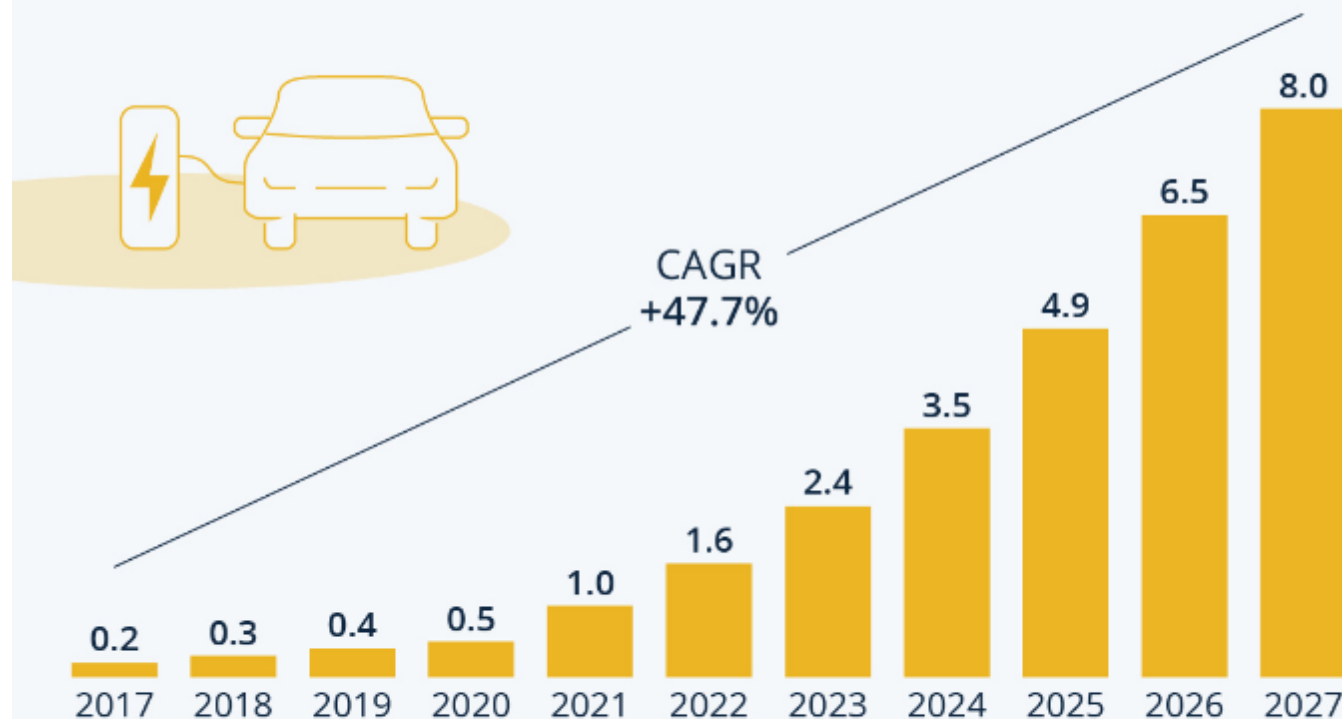
As the latest forecasts from Statista's [Mobility Market Outlook](#) indicate however, revenues in this essential piece of the electric mobility puzzle are finally starting to enter catch-up mode. As this infographic shows, after a number of years with slow progress being registered, turnover in the sector is picking up at a more significant speed.

When measured from 2017 to 2027, Statista currently expects a 47.7 percent compound annual growth rate for global electric vehicle infrastructure revenues. As detailed in [the report](#), the Mobility Market Outlook defines the scope of the forecasts as follows: "The electric vehicle infrastructure segment includes public charging stations. In this context, public means that the charging infrastructure is reachable via unrestricted access. Therefore, private charging stations at homes or residential parking lots, workplaces, car dealers, etc. are not included."

<https://www.statista.com/chart/28292/worldwide-electric-vehicle-infrastructure-revenues/>

Electric Vehicle Infrastructure Enters Catch-Up Mode

Forecast global electric vehicle infrastructure revenues (in billion U.S. dollars)



Source: Statista Mobility Market Outlook



EV charging network plans approved for all 50 states

Published Sept. 28, 2022 [Danielle McLean](#). Senior Editor



- The Federal Highway Administration has [approved plans](#) to build out a vast electric charging station network for all 50 states plus the District of Columbia and Puerto Rico, the agency announced yesterday.
- The [National Electric Vehicle Infrastructure](#) formula program created through the bipartisan infrastructure law last year [provides \\$5 billion to states](#) over five years to build EV charging stations every 50 miles along the federal highway system.
- The FHWA's approval unlocks \$1.5 billion in NEVI funds through fiscal years 2022 and 2023, allowing the build-out of chargers covering about 75,000 miles of highway, the agency stated Tuesday.

DOE Awards \$2.8 Billion to Supercharge U.S. Manufacturing of Batteries for Electric Vehicles and Electric Grid:

U.S. Department of Energy, October 19, 2022

<https://www.energy.gov/articles/biden-harris-administration-awards-28-billion-supercharge-us-manufacturing-batteries>

and

<https://www.sierraclub.org/press-releases/2022/10/sierra-club-applauds-biden-administration-s-multi-billion-dollar-investment>

and

<https://www.eenews.net/articles/what-bidens-2-8b-ev-battery-boost-means-for-jobs>

and

<https://www.utilitydive.com/news/doe-battery-manufacturing-minerals-processing-award/634562>

The U.S. Department of Energy has announced the first set of projects funded by the Bipartisan Infrastructure Law to expand domestic manufacturing of batteries for electric vehicles and the electrical grid and for materials and components currently imported from other countries. The 20 companies will receive a combined \$2.8 billion to build and expand commercial-scale facilities in 12 states to extract and process lithium, graphite and other battery materials, manufacture components, and demonstrate new approaches, including manufacturing components from recycled materials.



New Microgrid Will Power Electric Buses in Maryland

By [Lori Lovel](#) Published On Jul 15, 2022

Electric buses are predicted to make up [44% of new bus sales](#) and comprise a majority of the global bus fleet by 2040, according to Bloomberg. As adoption of electric buses, promulgated as a means to reduce costs as well as carbon emissions, gains momentum across the United States, recharging has become the next focus.

The [Bipartisan Infrastructure Law](#) will provide \$7.5 billion for an electric vehicle charging network across the country, but Montgomery County, Md., is poised to have one of the first transit systems to use microgrid technology for public, rather than private, transportation by powering its electric buses.

Solar panels powering the microgrid will be placed at the Brookville bus depot, which will be capable of charging up to 70 buses. Designed to survive natural disasters and disruptions of the electric grid, the microgrid will store energy generated by the solar panels, as well as natural gas power generation and the electric utility.

<https://www.ecmag.com/section/green-building/new-microgrid-will-power-electric-buses-maryland>

\$1.66B in grants for buses and bus facilities announced by Federal Transit Administration

150 transit agencies and states will receive funding from two grant programs that will enable the purchase of 1,100 zero-emission buses. Published August. 16, 2022

The Federal Transit Administration today announced [\\$1.66 billion in grants to transit agencies](#), territories and states for buses and bus facilities across the U.S. The agency said in a press release that the grants would enable the purchase of 1,800 new buses, including 1,100 zero-emission buses. The competitive grants were awarded through the FTA's [Buses and Bus Facilities](#) and [Low- and No-Emission Vehicle](#) programs, which were funded by the bipartisan infrastructure law enacted last year. The bipartisan infrastructure law provides \$5.5 billion over five years for the low-no program and nearly \$2 billion over five years for the bus program.

Large, small, mid-sized and tribal communities were among the 150 grant recipients awarded in this round. They include:

Columbus, Ohio: \$26.7 million to the Central Ohio Transit Authority to replace diesel buses with up to 28 battery-electric buses and chargers.

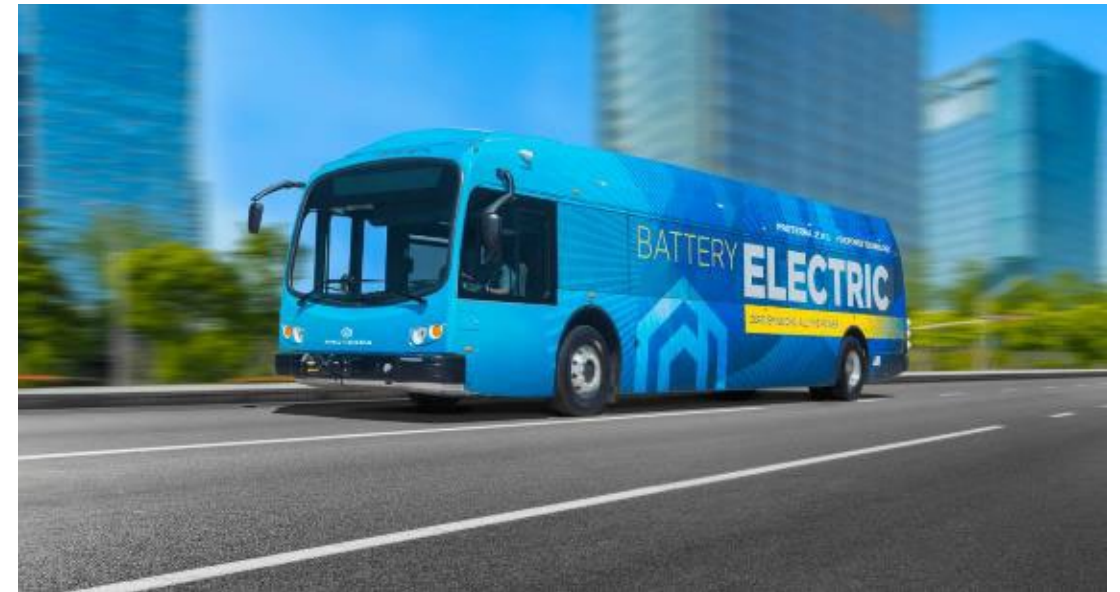
Houston: \$21.6 million to buy 20 battery-electric buses and charging infrastructure.

Missoula, Montana: \$10.9 million to buy 10 battery-electric buses and charging equipment. The agency committed to transition its entire fleet of vehicles to zero-emission technology by 2035 and, through this grant, it will reach 90% of that goal.

New York: \$116 million to the Metropolitan Transportation Authority to buy up to 230 battery-electric buses to replace older diesel buses and provide related workforce training and development.

Phoenix: \$16.4 million to buy up to 18 hydrogen fuel cell and battery-electric buses.

Washington, D.C.: \$9.5 million to buy up to 17 battery-electric buses to replace diesel vehicles and increase the size of the DC Circulator fleet.



Ford is moving to make the entire Mustang lineup electric within the next five years. The final gas-powered Ford Mustang will go into production in March 2023 as a 2024 model. A fully electric Mustang will likely come to market in 2028 as a 2029 model, completely replacing the gas-powered pony car. The current Mustang's Flat Rock, Michigan, assembly plant is the expected factory for the last ICE model and first BEV model.

Green Car Reports, by Stephen Edelstein, August 19, 2022

https://www.greencarreports.com/news/1136871_2024-ford-mustang-hybrid-nixed-lineup-going-electric-in-five-years

and

<https://insideevs.com/news/605189/final-gas-mustang-coming-ev-to-follow>

and

<https://www.autoweek.com/news/sports-cars/a40919901/get-ready-for-last-gas-engine-ford-mustang-and-an-ev>

Toyota has announced an additional investment of \$2.5 billion in its newest North American facility, Toyota Battery Manufacturing, North Carolina. This investment adds capacity to support battery electric vehicle (BEV) battery production. Scheduled to begin production in 2025, the facility will produce batteries for hybrid electric vehicles (HEV) and BEVs.

North American Clean Energy, August 31, 2022

<https://www.nacleanenergy.com/energy-storage/toyota-announces-2-5-billion-expansion-of-north-carolina-plant-with-350-additional-jobs-and-bev-battery-capacity>

Toyota announced an additional investment of \$2.5 billion in its newest North American facility, Toyota Battery Manufacturing, North Carolina. This investment follows the company's announcement that it is increasing electric vehicle production. The expanded manufacturing facility will not only provide the needed batteries, but will add 350 jobs, bringing the total employment to approximately 2,100. Scheduled to begin production in 2025, the facility will produce batteries for hybrid electric vehicles (HEV) and BEVs.

Toyota has a target of 40% of new vehicle sales in the U.S. to be electrified vehicles by 2025, and the target increases to 70% by 2030. This is one step along the path to achieving the company's goal of zero CO₂ emissions from new vehicles by 2050. With the new investment in its North Carolina battery manufacturing facility, the total commitment to advancing its battery production is now \$5.6 billion.

https://pv-magazine-usa.com/2022/09/01/toyota-to-invest-2-5-billion-to-expand-battery-manufacturing-in-north-carolina/?utm_source=USA+%7C+Newsletter&utm_campaign=aa729c6b7a-RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_80e0d17bb8-aa729c6b7a-158716569

PERSONAL EV GUIDANCE

Plug-in Electric Vehicle Charging



Charging your all-electric vehicle (EV) or plug-in hybrid electric vehicle (PHEV)—together known as plug-in electric vehicles (PEVs)—is similar to charging your other electronics. One end of an electrical cord is plugged into your car, and the other end is plugged into a power source or charging equipment.

There are three categories of charging equipment based on how quickly each can recharge a car's battery. Charging times for PEVs are also affected by:

- How much the battery is depleted
- How much energy the battery can store
- The type of battery
- Temperature

CHARGING COOPS - example

Arlington (VA) Solar and EV Charger Co-op



EcoAction Arlington is pleased to be a partner to the [Arlington Solar + EV Charging Co-op](https://coops.solarunitedneighbors.org/coops/arlington-2022-solar-and-ev-charger-co-op/) organized by Solar United Neighbors with support from the Arlington Initiative to Rethink Energy.

Solar co-ops bring homeowners together to take advantage of the group's bulk purchasing power to get discounted pricing and a quality installation for solar panels and EV charging stations.

Volunteer co-op members choose an installer on behalf of the entire group through an open and competitive bidding process. The selected installer provides co-op participants a personalized proposal for their consideration.

For more information please visit [here](https://coops.solarunitedneighbors.org/coops/arlington-2022-solar-and-ev-charger-co-op/): <https://coops.solarunitedneighbors.org/coops/arlington-2022-solar-and-ev-charger-co-op/>

<https://www.ecoactionarlington.org/community-programs/solar-co-op/>

State Policies Promoting Hybrid and Electric Vehicles

Austin Igleheart 4/26/2022 National Council of State Legislators (NCSL)

According to the U.S. Energy Information Administration, about [90% of the energy consumed](#) in U.S. transportation comes from petroleum. The transportation sector also is the leading source of greenhouse gas emissions (GHGs) in the U.S., accounting for [29% of the nation's GHGs](#). Although motivations among state policymakers vary, many states are working to diversify the transportation sector fuel mix and drive down emissions by encouraging the use of alternative fuels, including electricity, natural gas, hydrogen and biofuels. To accomplish this, many states have implemented incentives to promote the adoption of electric vehicles (EVs), including plug-in hybrid vehicles (PHEVs) and battery electric vehicles (BEVs).

Interactive map - Hybrid and Electric Vehicle Incentives. <https://www.ncsl.org/research/energy/state-electric-vehicle-incentives-state-chart.aspx>

As of July 2021, at least 47 states and the District of Columbia offer incentives to support deployment of EVs or alternative fuel vehicles and supporting infrastructure, either through state legislation or private utility incentives within the state. Legislative incentives include measures that provide high-occupancy vehicle (HOV) lane exemptions, financial incentives for purchasing electric vehicles or electric vehicle supply equipment (EVSE), vehicle inspections or emissions test exemptions, parking incentives and utility rate reductions. Utilities also offer incentives, rebates, and grants for transportation electrification. One of the most common incentives is price reductions for charging EVs during off-peak hours. For example, several electric utilities offer lower off-peak price per kilowatt-hour. Other utilities incentivize purchasing EVs and equipment through rebates.

Several states have implemented financial incentives, including tax credits, rebates and registration fee reductions designed to promote EV adoption. For example, Colorado offers a \$4,000 tax credit through 2021 on the purchase of light-duty EVs, and Connecticut allows for a reduced biennial vehicle registration fee of \$38 for EVs. Additional incentives include electric charging infrastructure tax credits, research project grants, alternative fuel technology loans, and lead-by-example initiatives like zero-emission vehicle (ZEV) requirements for government fleets.



Many studies have looked at the benefits of electric vehicle (EV) managed charging—shifting charging to a time and place that supports the electricity grid—and a new literature review from the National Renewable Energy Laboratory explores the overall potential value of this charging strategy.

This comprehensive study finds there are significant benefits of managed charging, including decreased emissions and power system costs and increased reliability. However, researchers also find the potential value changes with power system characteristics and EV use.

<https://www.nrel.gov/news/program/2022/aligning-utilities-electric-vehicles-for-greater-grid.html>

RESOURCES

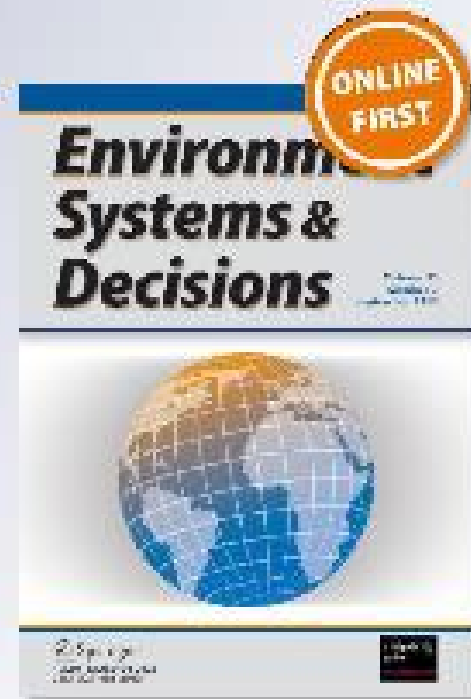
*Perspective on multi-scale assets for clean
energy technologies in buildings*

Scott Sklar

Environment Systems and Decisions
Formerly The International Journal of

Environment Systems and Decisions

Environ Syst Decis
DOI 10.1007/s10669-013-9425-0



Any questions ???

Need reports, contacts ???

There is no such thing as a poor question !

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Phillip Kobernick
Peninsula Clean Energy

EV Charging at Scale

Overview of Peninsula Clean Energy's
EV Charging Cost Containment and
Scaling Strategies



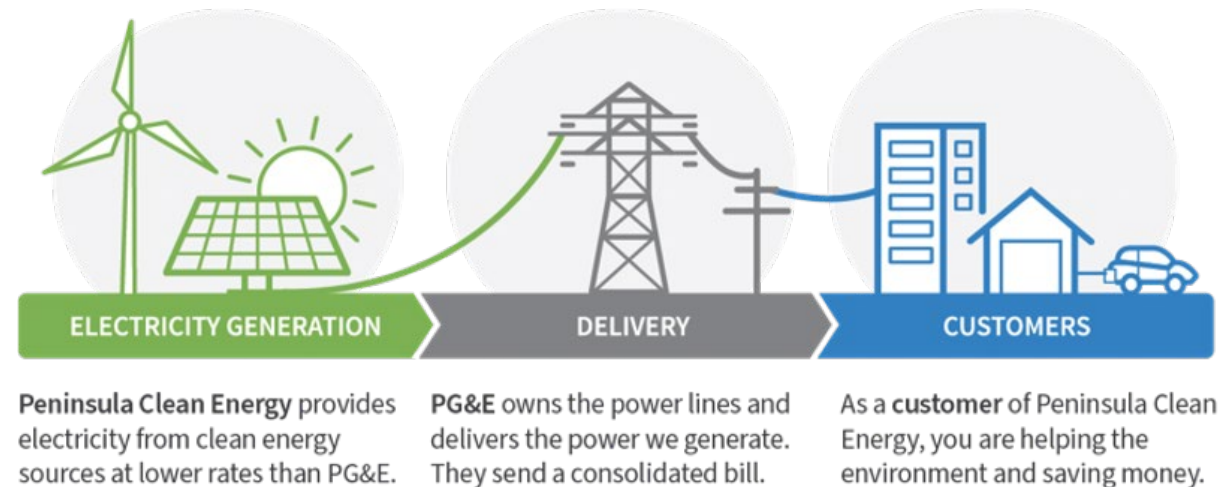
Peninsula Clean Energy



Peninsula Clean Energy is the not for profit locally-led electricity provider for San Mateo County and Los Banos.

Mission: To reduce greenhouse gas emissions by expanding access to sustainable and affordable energy solutions

How it works

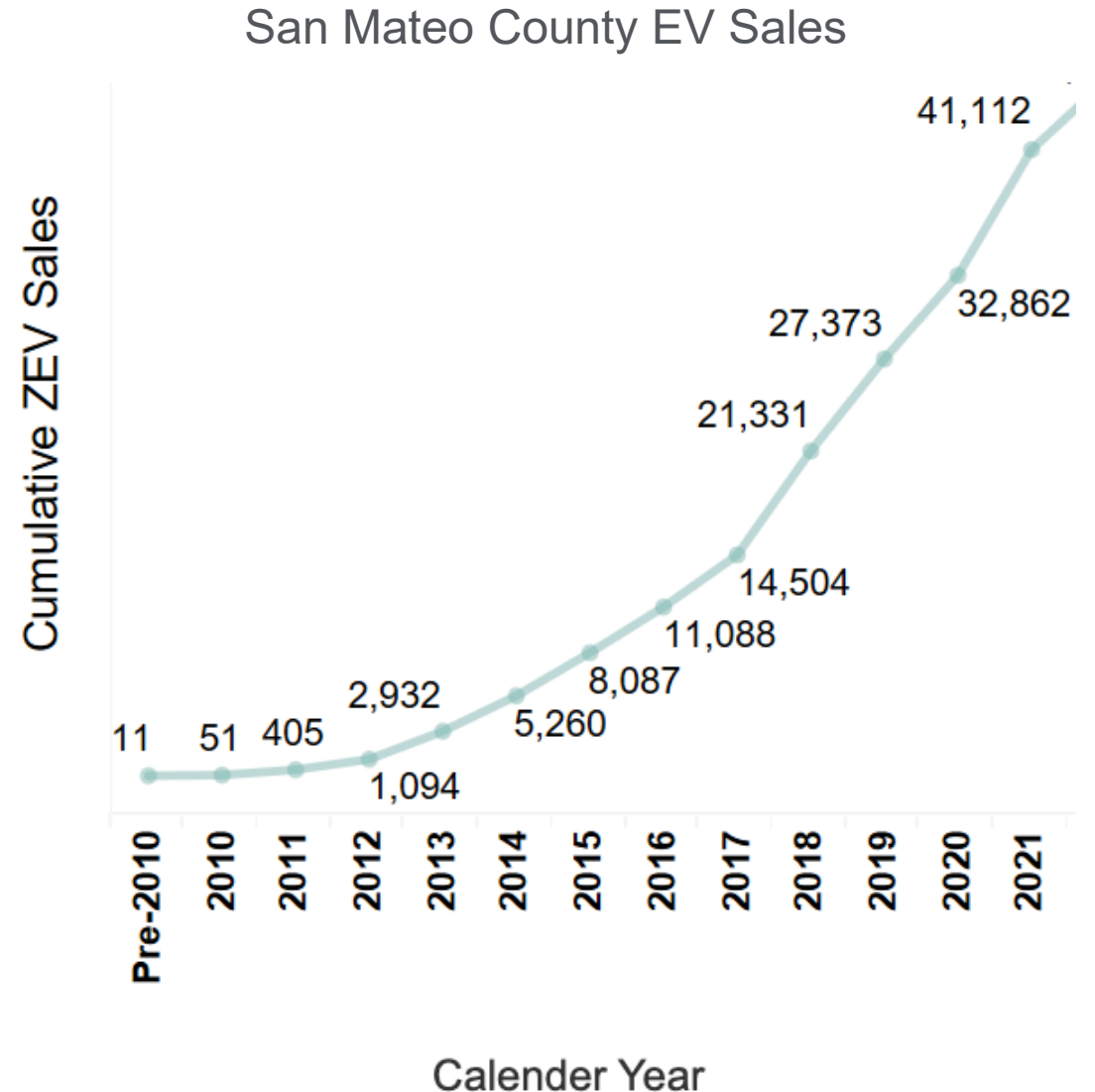


EV Adoption Wave is Here!

1/4 personal vehicles
sales EV in 2021 (San
Mateo County)

250K EVs sold in CA in
2021 (13% of all new
sales)

Gas vehicle sales banned
in 2035



Challenges with EV Charging

California not on pace to meet targets

- California projected need:
 - 3.8M - 6M charge ports by 2030
- Multifamily access is especially critical
- Major equity implications
- Principal gating issue is cost and inadequate power supply



Daily EV Charging Needs



EV Charging Intro: Speed

Speed

Level 1

3-4 miles per
charging hour



Level 2

10-20 miles per
charging hour



Level 3

150+ miles per charging hour

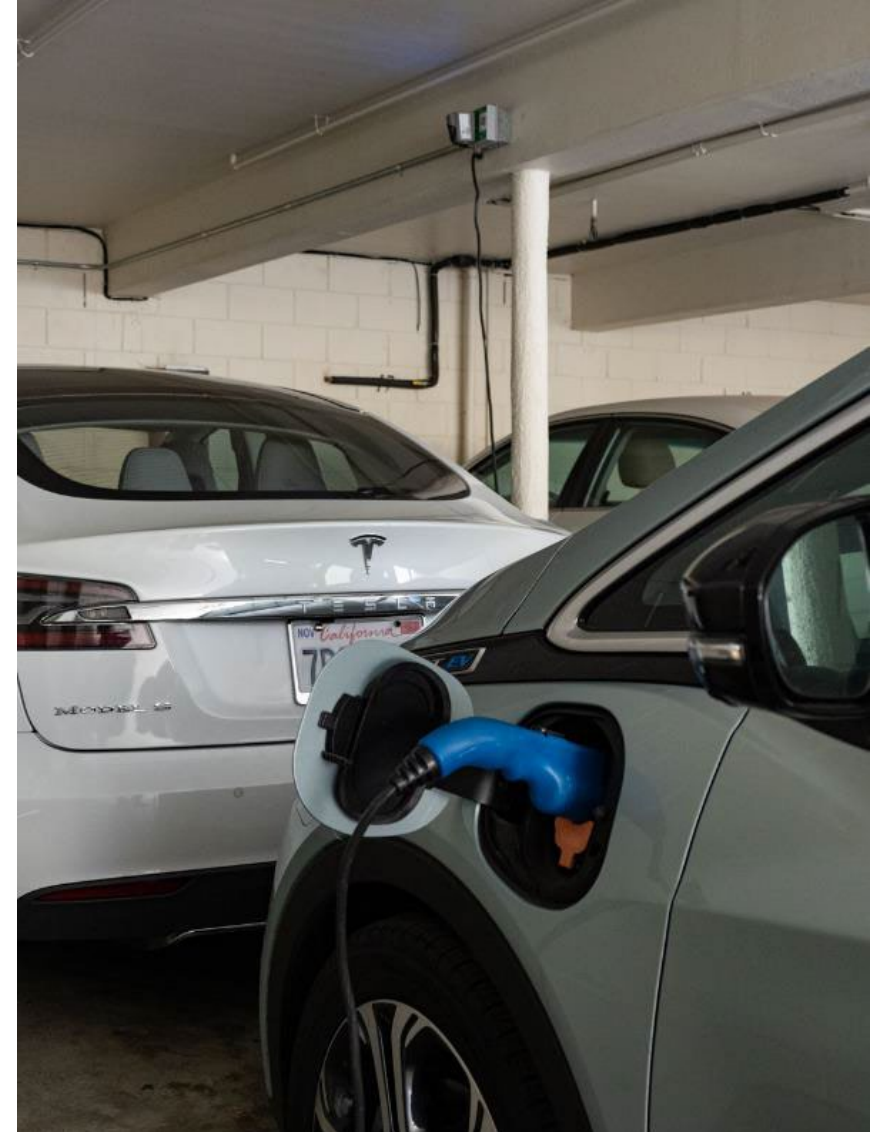


The EV Charging Solution

“Right-sizing” charging

Driver need? ~ 25 - 35 mi/day

- 1 hour on 7.2 kW L2 – far overbuilt for resi
- Level 1 = 1.9 kW (dedicated 20-amp circuit) provides 40-50+ miles overnight
 - Level 1 (120v) and power managed L2 (208-240v)
 - Meets the needs of 94% of drivers



The EV Charging Solution

Costs

- Level 1: as low as \$2,000/port
- Power-managed Level 2: \$4,000 - \$5,000/port
- “Traditional” Level 2: \$18,000+/port (PG&E)
- 4x to 6x the number of ports for same capacity



Level 1 outlets installed by PCE at multi-family property

What are Advanced Load Mgmt Systems?

- Designed to balance power so that total energy draw doesn't exceed a circuit or panel capacity
- Only triggered when enough EV charging occurs
- Can avoid significant electrical capacity upgrades
- NEC 625.14 and UL approved for safety
- Two configurations: panel sharing and circuit sharing

NEC 625.14

“Where an automatic load management system is used, the maximum electric vehicle supply equipment load on a service and feeder shall be the maximum load permitted by the automatic load management system.”

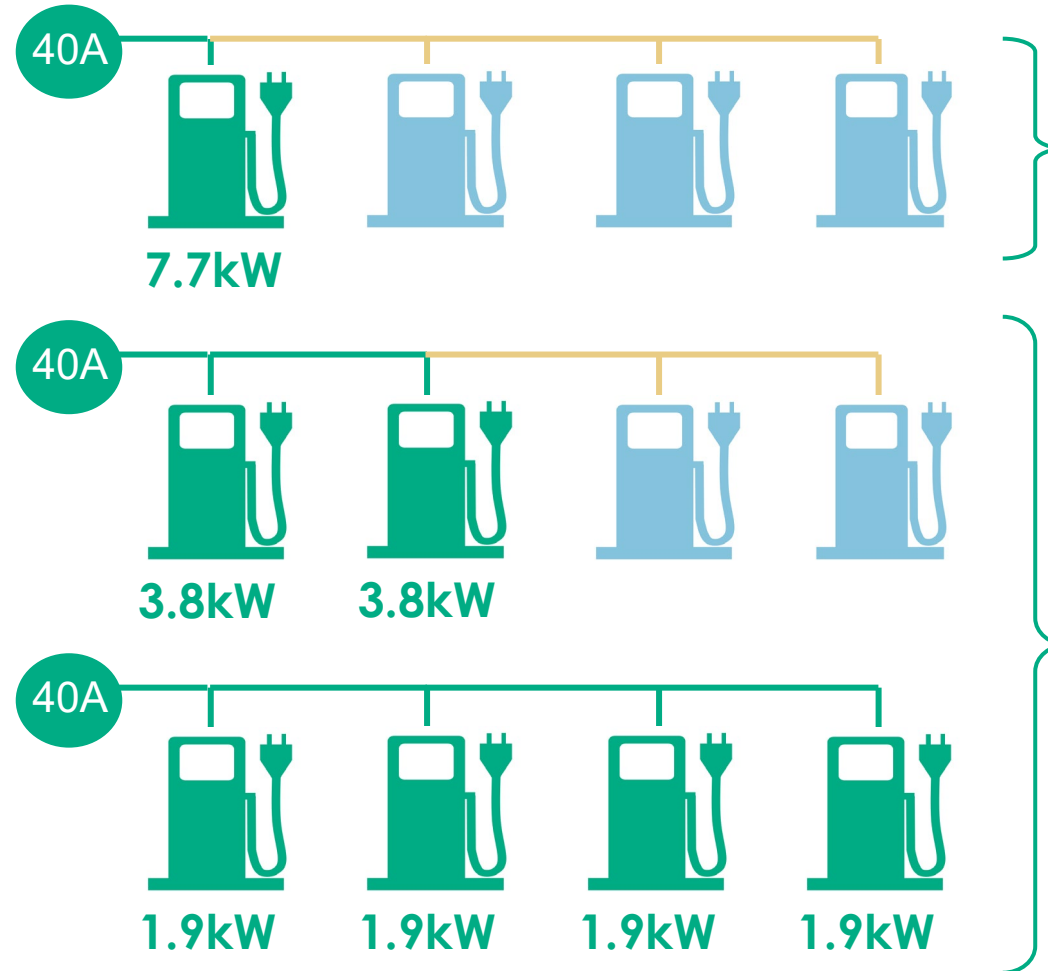
Power Mgmt: Circuit Sharing Example

Definition: Multiple charging stations share the same electrical circuit



Circuit
40A (32A draw),
240V, 7.68 kW
available

Unmanaged EVSE
load = 160A, 28.8K
(4x oversubscription)



When one EV is actively charging, all circuit power is delivered to that station

Power is divided evenly as additional EVs are actively charging on the same circuit

Minimum of ~60+ miles of range provided with overnight charge at MUDs.
Real-world charge will be higher due to power balancing.

Multi-Family EVSE Retrofit Example

Background

- 17-unit apartment building, built in 1975
- Not enough power in main panel to support Level 2 charging for all residents at full power

Project Details

- Original request: 4 Level 2 ports
- Accepted project: 2 Level 2 ports w/ power mgmt and 15 Level 1 outlets (17 ports total)
- **Provides charging to all residents**
- Per port cost: \$5,300
- Installing 17 Level 2 ports would have cost \$250,000+ (average \$14,750+/port)

San Mateo Apartments



What are Reach Codes?

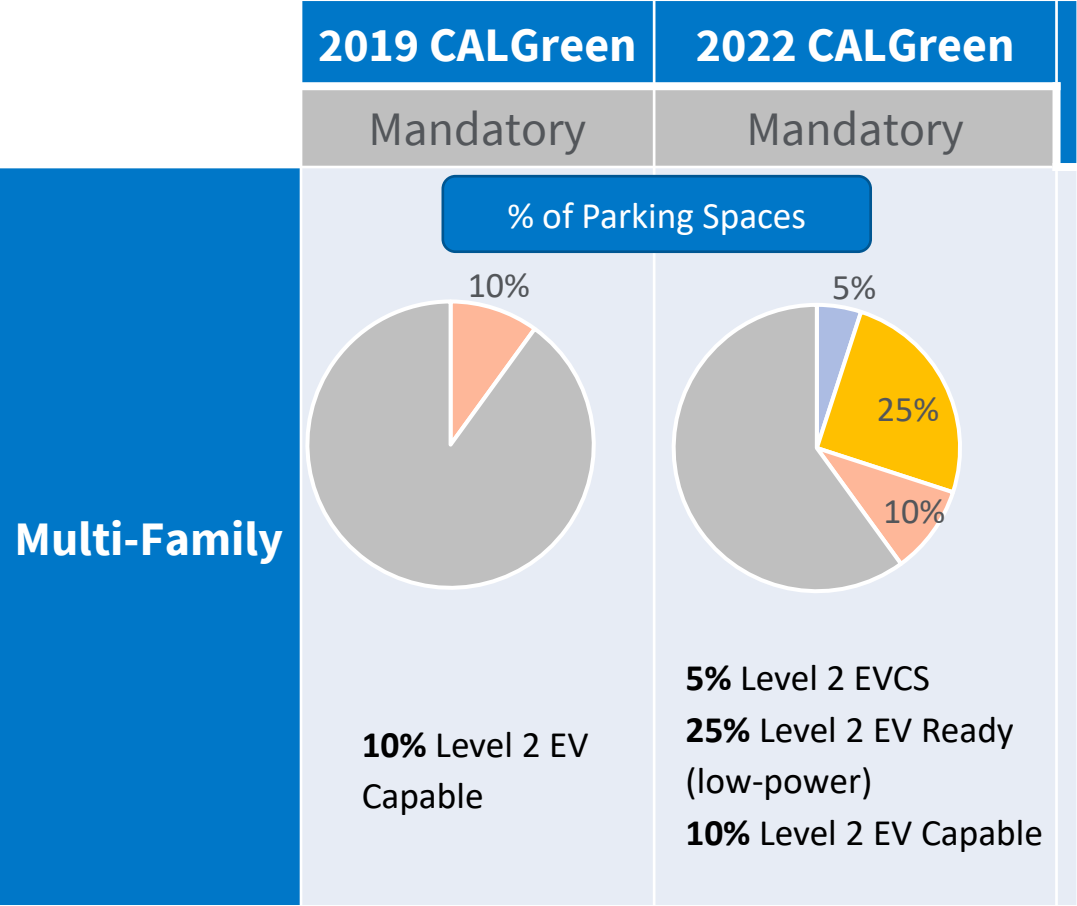
Reach Codes require EV charging during new construction

- Local enhancements to state code
- Can be adopted at any time
- Adopted in dozens of cities across California
- 100% access to EV charging at multi-family housing

<https://bayareareachcodes.org/>



EV Codes – New Construction



Thanks!

Phillip Kobernick
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APRIL
11-13
2023



S A V E T H E D A T E
Better Buildings, Better Plants
SUMMIT

Learn more: betterbuildingsolutioncenter.energy.gov/summit

U.S. DEPARTMENT OF
ENERGY

Explore the Residential Program Guide

Resources to help improve your program and reach energy efficiency targets:

- [Handbooks](#) - explain *why* and *how* to implement specific stages of a program.
- [Quick Answers](#) - provide answers and resources for common questions.
- [Proven Practices](#) posts - include lessons learned, examples, and helpful tips from successful programs.
- [Technology Solutions](#) **NEW!** - present resources on advanced technologies, **HVAC & Heat Pump Water Heaters**, including installation guidance, marketing strategies, & potential savings.
- [Health + Home Performance Infographic](#) **NEW!** – spark homeowner conversations.



<https://rpssc.energy.gov>

Health + Home Performance Infographic

Do You Have a “Healthy Home?”

A qualified contractor can help you assess and address indoor air quality, improve your comfort, and cut your utility bills.

Answers to a few basic questions can help you get started:

- **How old are your heating and cooling systems?**
Ensuring your system is updated and well maintained can save money and improve health and comfort.
- **Is your home insulated?**
Properly installed insulation in your walls and attic, at levels recommended for your home's climate, will cut bills, and improve comfort.
- **Have you ever noticed mold in your home?**
Visible mold likely means humidity levels need to be better addressed or indicates a potential leak or water damage.
- **Are your windows caulked and doors weather-stripped?**
These relatively simple fixes reduce air leaks and help maintain indoor temperature levels.
- **Are your appliances ENERGY STAR® rated?**
ENERGY STAR appliances are energy efficient and help you save money.
- **Do you know if your home's heating and cooling systems include proper levels of ventilation?**
Effective ventilation is important for both health and safety. Ventilation, along with frequently replaced air filters, can help make sure your home is bringing in fresh air as needed, and keep out pollutants when outdoor air quality is poor due to ozone, fire, or other factors.

GET started

FIND A QUALIFIED CONTRACTOR:

- Home Performance with ENERGY STAR® at ENERGYSTAR.gov/HomePerformance
- Building Performance Institute at bpi.org/locator-tool

U.S. DEPARTMENT OF ENERGY | OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY
BUILDING TECHNOLOGIES OFFICE

DOE/EE-2349

HOME PERFORMANCE WITH ENERGY STAR

DOE’s new Health + Home Performance Infographic reveals the link between efficiency and health – something everyone cares about. Efficiency programs and contractors can use the question-and-answer format to discover a homeowner’s needs.

The infographic is ideal for the “kitchen table” conversations where people decide what to do – and who they want to do it. It also has links for homeowners to find a qualified contractor if they do not already have one.

[Download](#) this infographic from DOE’s Better Buildings Residential Network.

Thank You!

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[Office of Energy Efficiency and Renewable Energy Facebook](#)

Please send any follow-up questions
or future call topic ideas to:
bbresidentialnetwork@ee.doe.gov